## REMARKS

Claims 1-5, 10 and 12-18 have been rejected under 35 U.S.C. 102 as being anticipated by Krishnan. This rejection is respectfully traversed.

The broadest of the rejected claims relate to a method of lithographic printing using a self-dampening lithographic ink composition comprising a glycerol, a nonionic surfactant having an HLB of about 8-20 and about 20-50 % water. This method is not taught or suggested by the Krishnan patent.

Krishnan teaches a method of lithographic printing using a water based printing ink without the need for any accompanying fountain solution. The ink contains 20-60% water, 10-70% binder, 2-30% pigment and 0.5-10% rewetting agent. The reference teaches that suitable examples of rewetting agents include urea, thiourea, hydroxyethylene urea, glycerol, sorbitol, ethylene glycol and butyl carbitol. The ink also preferably includes a nonionic surfactant in an amount up to 5% of which acetylenic glycol, ethoxylated glycols and sorbitan esters are identified as suitable.

It is well established that a generic disclosure cannot constitute an anticipation under 35 U.S.C. § 102. See, *Corning GlassWorks v. Sunnitomo Electric U.S.A., Inc.*, 9 USPQ2d 1962, 1970 (Fed. Cir. 1989). In this connection, there are two aspects of the Krishnan reference which have only a generic disclosure vis-a-vis the instant claims. The first relates to the glycerol. Krishnan identifies seven rewetting agents, only one of which is glycerol. That means that a selection must be made between these seven entities in order to anticipate the claims.

The second generic disclosure relates to the nonionic surfactant. The Examiner has stated that one skilled in the art would have reason to believe at least one surfactant in the known classes described in the reference (acetylene glycols,

ethoxylated glycols and sorbitan esters) would have an HLB of 8-20. The Examiner is correct but by being correct, the anticipation rejection becomes untenable because it requires a selection among the possible surfactants to be made. For example, the attached promotional material from Oilchem, Inc. shows that, for example, sorbitol esters had HLBs which varied from 1.8 to 18.3. Similarly, the attached promotional material from Air Products shows that nonionic alkoxylated acetylenic based surfactants can have HLBs which are less than 8 or greater than 8.

Since at least two of the ingredients in the Krishnan composition require a selection between possibilities, the disclosure of this reference is at best generic to the instant claims. There are no species disclosed in the reference which fall within the scope of the instant application's claims. Thus, the ink Example I in the reference does not contain a glycerol, and the HLB of the ethoxylated acetylenic diol surfactant is not stated.

There is also no basis for asserting that the Krishnan reference renders the claimed invention obvious. There is nothing in this reference which teaches that one should select glycerol as a rewetting agent at the same time a nonionic surfactant having an HLB of about 8-20 is selected. Indeed, the reference does not indicate that the HLB of the surfactant has any significance whatsoever, as apparent from the fact that it does not even mention that the surfactants have an HLB.

In light of the foregoing considerations, it is respectfully submitted that the anticipation rejection over Krishnan should be withdrawn.

Claims 6-9 and 11 were rejected under 35 U.S.C. 103 over Krishnan in view of Best and Wasilewski. This rejection is also respectfully traversed.

Krishnan has been discussed above. Best has been cited only to show the use of a mineral oil in a water-in-oil ink emulsion and thus is not asserted to, nor in fact does it, cure any of the basic deficiencies in Krishnan. Moreover, there is no teaching or suggestion in Best that mineral oil can be a component of a self-dampening lithographic ink and there is, accordingly, no reason or motivation to combine these references.

Wasilewski has been cited to show that certain nonionic surfactants having an appropriate HLB exist. The fact that such surfactants exist has previously been acknowledged and does not add anything to this rejection. However, the Office Action asserts that one would be motivated to use the Wasilewski nonionic surfactants because they have the "advantage of reducing surface tension among chemical molecules." In response, Applicants respectfully point out that the function of all surfactants is to reduce interfacial surface tension and this is the very reason that a surfactant is used under any circumstances. Accordingly, the "advantage of reducing surface tension" does not constitute a reason for selecting the Wasilewski surfactants rather then any other surfactant. Moreover, Wasileswski teaches a printing ink composition which is not self-dampening because it requires the use of an aqueous fountain solution (see e.g. column 1, line 61 to column 2, line 20). If anything, this reference teaches away from using the nonionic surfactants disclosed in its text in a self-dampening composition.

Finally, claims 6-9 and 11 were also rejected under 35 U.S.C. 103 over Krishnan in view of Wasilewski. The elimination of the Best reference from the combination does not alter the inadequacy of the Krishnan Wasilewski combination and does not serve to render the claimed invention obvious.

In view of all of the foregoing considerations, it is respectfully submitted that this application is now in condition to be allowed and the early issuance of a Notice of Allowance is respectfully solicited.

Dated: December 9, 2005

Respectfully submitted,

By Edward A. Meilman

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# PERSONAL CARE

## Personal Care | Nonionic Surfactants

### 1:1 Diethanolamides

| | |
|---|---|
| Amide:85% | Coconut |
| : Liquid | |

Applications: Economical foam boosters and viscosifier. Used in shampoos, bubble baths, liquid hand and boc and household and institutional cleaners.

### 1:1 Diethanolamides

| | |
|---|---|
| Amide:95% | Coconut |
| : Liquid | |

Applications: High performance cosmetic grade amides. Exceptional viscosity builders in high foaming shampc products.

### 1:1 Diethanolamides

| | |
|---|---|
| Amide:85% | Linoleic |
| : Liquid | |

Applications: Superfatting agent. Extremely effective thickener for low active shampoo, bubble bath and hand s conditioning properties to hair and skin products.

### 1:1 Diethanolamides

| | |
|---|---|
| Amide:95% | Lauric |
| : liquid | |

Applications: Outstanding foam boosting and stabilization. Greatly enhances viscosity and performance in han shampoos and related cosmetics.

### 1:1 Monoethanolamides

| | |
|---|---|
| Amide:88%- 96% | Coconut |
| : Flakes | |

Applications: Adds opacity, thickening, foam boosting, foam stabilization and mildness. Used in solid detergen controlled release cleaners.

### 1:1 Monoethanolamides

| | |
|---|---|
| Amide:95% | Lauric |
| : Flakes | |

Applications: Useful in foaming bath powders.

### 1:1 Monoethanolamides

| | |
|---|---|
| Amide:95% | Stearic |
| : Flakes | |

Applications: High melting point. Very mild. Binder and conditioner for syndet and combo bar soaps. Stabilizes institutional laundry powder to high use temperatures.

### 2:1 Alkanolamides

| | |
|---|---|
| Amide:72% | Coconut |
| : Liquid | |

Applications: Versatile foam booster, stabilizer and viscosifier for shampoos, bubble baths, powdered and liqui

### Aromatic Ethoxylates

| | |
|---|---|
| 5.0 | <20 |
| HLB: 10.0 | |

Applications: Anti-icing additive for gasoiline. Solubilizer/dispersant for hair colorants. Used in every type of de phases of aqueous textile, pulp and paper processing. Also for industrial metal cleaners, floor cleaners and sa emulsifier for nonpolar solvent emulsion cleaners, detergents, floor cleaners and floor polishes.

### Castor Oil Ethoxylates

| | |
|---|---|
| Chemical/CTFA Name:PEG-15 Castor Oil | Molecular Weight:1600 |
| | |

| | |
|---|---|
| EO Content,wt%: 41.3 | HLB: 8.2 |
| Hydroxyl Number: 105 | Water Solubility: Insoluble |
| Applications: Emulsifier, viscosity control agent, dispersant, lubricant, solubilizing agent, emollient. | |

**Castor Oil Ethoxylates**

| | |
|---|---|
| Chemical/CTFA Name:PEG-20 Castor Oil | Molecular Weight:1820 |
| EO Content,wt%: 48.4 | HLB: 9.7 |
| Hydroxyl Number: 92 | Water Solubility: Insoluble |
| Applications: Emulsifier, wetting agent, dispersant, lubricant, solubilizing agent, metal processing. | |

**Castor Oil Ethoxylates**

| | |
|---|---|
| Chemical/CTFA Name:PEG-30 Castor Oil | Molecular Weight:2260 |
| EO Content,wt%: 58.4 | HLB: 11.7 |
| Hydroxyl Number: 74.5 | Water Solubility: Insoluble |
| Applications: Emulsifier, softener, dispersant, lubricant, solubilizing agent and rewetting agent. | |

**Castor Oil Ethoxylates**

| | |
|---|---|
| Chemical/CTFA Name:PEG-25 Castor Oil | Molecular Weight:2040 |
| EO Content,wt%: 53.9 | HLB: 10.7 |
| Hydroxyl Number: 82.5 | Water Solubility: Insoluble |
| Applications: Emulsifier, softener, dispersant, lubricant, solubilizing agent and rewetting agent. | |

**Castor Oil Ethoxylates**

| | |
|---|---|
| Chemical/CTFA Name:PEG-60 Castor Oil | Molecular Weight:3580 |
| EO Content,wt%: 73.7 | HLB: 14.7 |
| Hydroxyl Number: 47 | Water Solubility: Soluble |
| Applications: Emulsifier, emollient, dispersant, antistat, lubricant, solubilizing agent, superfatting agent and sof | |

**Nonionics with Ester Groups**

| | |
|---|---|
| Flakes | 60-67 C |
| HLB: 1.4 | Chemical/CTFA Name: Glycol Distearate ( |
| Applications: Opacifier and pearlizing agent in personal care and detergent systems. | |

**Nonionics with Ester Groups**

| | |
|---|---|
| Flakes | 57-61C |
| HLB: 2.7 | Chemical/CTFA Name: Glycerol Stearate ( |
| Applications: Pearlizing agents in shampoos, liquid hand and body soaps, and liquid detergents. Emulsion stal | |

**Nonionics with Ester Groups**

| | |
|---|---|
| Flakes | 58-63C |
| HLB: 4.5 | Chemical/CTFA Name: Glycerol Stearate |
| Applications: Lipophilic emulsifier for creams, lotions, sunscreens and antiperspirants. Opacifies and thickens. | |

**Nonylphenol Ethoxylate**

| | |
|---|---|
| 1.5 | <20 |
| HLB: 4.6 | |
| Applications: Extremely oil soluble surfactant and intermediate. Stabilizes foam at low levels and defoams at h emulsifier in surfactant concentrates. Emulsion stabilizer. Oil soluble detergent and dispersant for petroleum oi | |

**Nonylphenol Ethoxylate**

| | |
|---|---|
| 6 | <20 |
| HLB: 10.8 | |
| Applications: Borderline oil and water solubility. Intermediate to anionic surfactants. Emulsifiers and coupling a emulsifier for mineral oil, silicones and agricultural compounds. | |

**Nonylphenol Ethoxylate**

| | |
|---|---|
| 4 | <20 |
| HLB: 8.8 | |
| Applications: Plasticizer and antistat for PVAc. Freeze-thaw stabilizer for latices. Oil soluble detergent/dispersa | |

**Nonylphenol Ethoxylate**

| | |
|---|---|
| 30 | 74-78 1% in 10% NaCl |
| HLB: 17.2 | |
| Applications: Used in high temperature scouring of textiles. Solubilizer for toxaphene, kerosene and essential | |

**Peq Esters, Ethoxylated Acids and Oils**

| | |
|---|---|
| Liquid | HLB:7.2 |
| | |

| | |
|---|---|
| Chemical/CTFA Name: PEG-8 Dioleate | |
| Applications: Oil soluble emulsifier for defoamers and fiber finishes. Adds lubricity. Co-emulsifiers and opacifie | |

**Peq Esters, Ethoxylated Acids and Oils**

| | |
|---|---|
| Liquid | HLB:11.0 |
| Chemical/CTFA Name: PEG-8 Oleate | |
| Applications: Emulsifier for fats. Useful in straight oils and soluble oils. | |

**Peq Esters, Ethoxylated Acids and Oils**

| | |
|---|---|
| Liquid | HLB:10.0 |
| Chemical/CTFA Name: PEG-12 Dioleate | |
| Applications: Emulsifier/solubilizer for oils, fats and solvents in metal working fluids, textile lubricants and pesti | |

**Peq Esters, Ethoxylated Acids and Oils**

| | |
|---|---|
| Viscous Liquid | HLB:12.0 |
| Chemical/CTFA Name: PEG- 30 Castor Oil | |
| Applications: Emulsifier for fats, oils, fatty acids, waxes and solvents. Dispersant for pigments and iron powder fluids. Paper dye-leveling agent. Softening and rewetting agent for wet strength paper. Stablilizer for PVAc em degreasers and fat liquoring. Maintains viscosity of water-emulsion paints over wide temperature range. Emuls binders. Co-emulsifier for fabric softners and dye carriers. | |

**Peq Esters, Ethoxylated Acids and Oils**

| | |
|---|---|
| Solid | HLB:13.6 |
| Chemical/CTFA Name: PEG-40 Castor Oil | |
| Applications: Used to emulsify vitamins and other pharmaceuticals. Other uses similar to PEG-30 Castor Oil. | |

**Peq Esters, Ethoxylated Acids and Oils**

| | |
|---|---|
| Liquid | HLB:18.3 |
| Chemical/CTFA Name: PEG-200 Castor Oil | |
| Applications: Effective emulsifier for mineral oil, triglycerides and alkyl esters. Textile antistat, lubricant and dye | |

**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Liquid | HLB:16.7 |
| Chemical/CTFA Name: Poly Sorbate 20 | |
| Applications: Emulsifiers/solubilizes vitamin oils, essential oils, balsam, fragrances and tars in cosmetics and p as a thickener for shampoos and nylon spin finishes. Emulsifier for dye carriers. | |

**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Liquid | HLB:18.3 |
| Chemical/CTFA Name: PEG-80 Sorbitan Laurate | |
| Applications: Reduces irritancy of baby shampoos and children's bath care products. | |

**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Liquid | HLB:15.0 |
| Chemical/CTFA Name: Polysorbate 80 | |
| Applications: Emulsifies fatty alcohols in tobacco sucker control agents. Versatile O/W emulsifier. Co-emulsifie for petroleum oils, fats, solvents and waxes. | |

**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Liquid | HLB:11.0 |
| Chemical/CTFA Name: Polysorbate 85 | |
| Applications: Emulsifier/co-emulsifier for oils, fats and waxes. For textile, leather , fiberglass, metal lubricants a | |

**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Liquid | HLB:8.6 |
| Chemical/CTFA Name: Sorbitan Monolaurate | |
| Applications: Water dispersible emulsifier for oils and fats in cosmetics and industrial products. Also used as lu for PVC. | |

**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Liquid | HLB:4.3 |
| Chemical/CTFA Name: Sorbitan Monooleate | |
| Applications: Versatile oil soluble emulsifier/coupler for medicines, oils, fats, and waxes in cosmetic, textile and Pigment dispersant in lipsstick, eyeliners, mascaras, etc. Used in oil-based ointments, creams and lotions to in reduce greasiness. | |

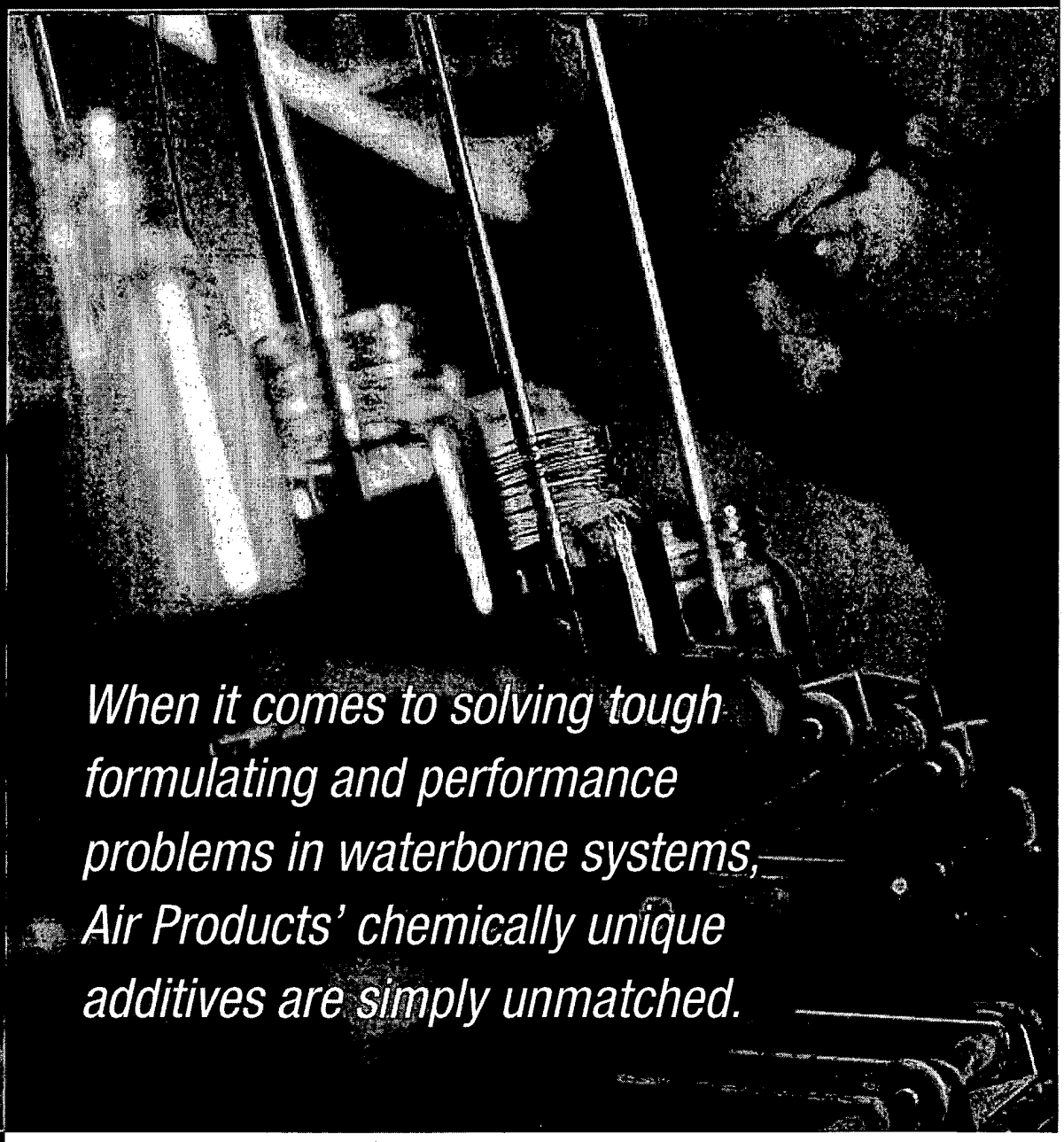
**Sorbitol Esters and Ethoxylated Sorbitol Esters**

| | |
|---|---|
| Solid Beads | HLB:4.7 |
| Chemical/CTFA Name: Sorbitan Monostearate | |

| | |
|---|---|
| Applications: Water/oil emulsifier used in creams, lotions and mkeup preparations. Also serves as a textile lubr | |
| **Sorbitol Esters and Ethoxylated Sorbitol Esters** | |
| Liquid | HLB:1.8 |
| Chemical/CTFA Name: Sorbitan Trioleate | |
| Applications: Used to formulate textile and leather softeners. Coupler and co-emulsifier for mineral oil. | |

**50 Industrial Circle, Lincoln, RI USA 02865, 401-722-2410**

AIR PRODUCTS



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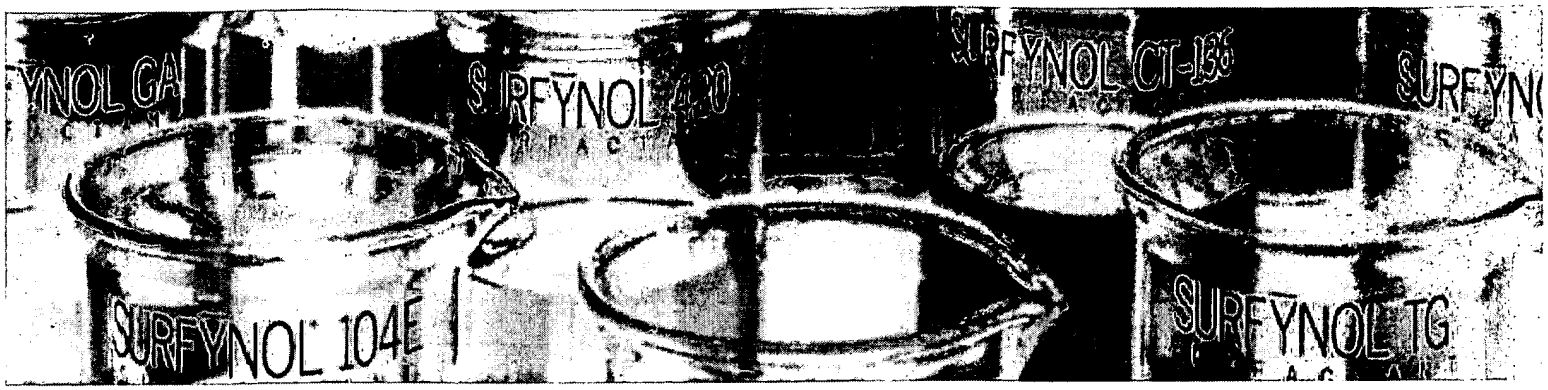
# Surfynol®, Dynol™, and EnviroGem® Additives

*reference guide*




## *Surfynol Surfactants*

Surfynol 104 Surfactant
Surfynol 104A Surfactant
Surfynol 104BC Surfactant
Surfynol 104DPM Surfactant
Surfynol 104E Surfactant
Surfynol 104H Surfactant
Surfynol 104PA Surfactant
Surfynol 104PG-50 Surfactant
Surfynol 104S Surfactant
Surfynol 2502 Surfactant
Surfynol 420 Surfactant
Surfynol 440 Surfactant
Surfynol 465 Surfactant
Surfynol 485 Surfactant
Surfynol 485W Surfactant
Surfynol 502 Surfactant
Surfynol 504 Surfactant
Surfynol 61 Surfactant
Surfynol FS-80 Surfactant
Surfynol FS-85 Surfactant
Surfynol OP-340 Surfactant
Surfynol PSA-204 Surfactant
Surfynol PSA-216 Surfactant
Surfynol PSA-336 Surfactant
Surfynol SE Surfactant
Surfynol SE-F Surfactant

## *EnviroGem Surfactants*

EnviroGem AD01 Surfactant
EnviroGem AE01 Surfactant
EnviroGem AE02 Surfactant
EnviroGem AE03 Surfactant

## *Dynol High-Performance Surfactant*

Dynol 604 Surfactant

## *Surfynol Antifoams/Defoamers*

### Acetylenic-Based

Surfynol DF-37 Defoamer
Surfynol DF-110D Defoamer
Surfynol DF-110L Defoamer
Surfynol MD-20 Defoamer
Surfynol PC Surfactant

### Silicone-Based

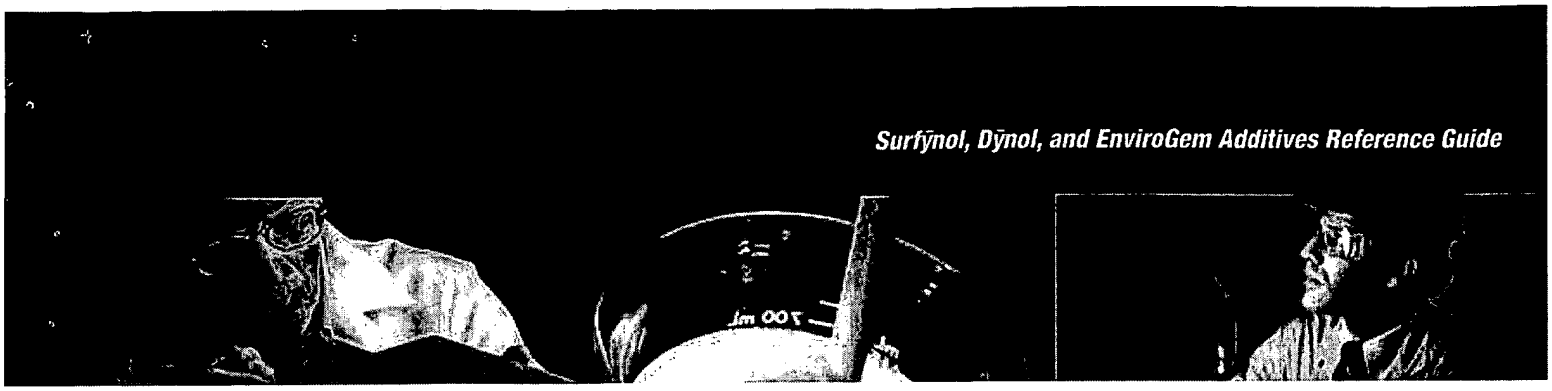
Surfynol DF-58 Defoamer
Surfynol DF-62 Defoamer
Surfynol DF-66 Defoamer
Surfynol DF-574 Defoamer
Surfynol DF-695 Defoamer

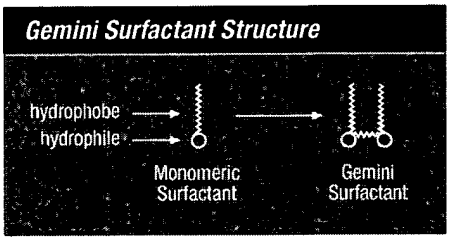
### Organic-Based

Surfynol DF-70 Defoamer
Surfynol DF-75 Defoamer
Surfynol DF-210 Defoamer

## *Surfynol Pigment Dispersion Additives*

Surfynol CT-111 Surfactant
Surfynol CT-121 Surfactant
Surfynol CT-131 Grind Aid
Surfynol CT-211 Surfactant
Surfynol CT-221 Surfactant
Surfynol CT-231 Surfactant
Surfynol CT-136 Grind Aid
Surfynol CT-141 Dispersant
Surfynol CT-151 Dispersant
Surfynol CT-171 Grind Aid
Surfynol CT-324 Grind Aid
Surfynol GA Surfactant
Surfynol TG Surfactant



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This brochure is intended to give an overview of our complete line of Surfynol, Dynol and EnviroGem additives. Some of these products may not be commercially available in all regions. Please check with your local Air Products office. Additionally, not all of these products are stocked in all regions, so lead time for product delivery may vary.

## *Surfynol Surfactants*

### Surfynol 104 Surfactant[1]

Wetting Agent and Defoamer: A nonionic surfactant that has multifunctional benefits, including wetting and foam control, in aqueous systems. Due to its hydrophobic nature, the product has reduced water sensitivity when compared to conventional surfactants.

**Surfynol 104**
100% waxy solid

**Surfynol 104A**
50% Surfynol 104 and
50% 2-Ethylhexanol

**Surfynol 104BC**
50% Surfynol 104 and
50% 2-Butoxyethanol

**Surfynol 104DPM**
50% Surfynol 104 and
50% Dipropylene Glycol
Monomethyl Ether

**Surfynol 104E**
50% Surfynol 104 and
50% Ethylene Glycol

**Surfynol 104H**
75% Surfynol 104 and
25% Ethylene Glycol

**Surfynol 104PA**
50% Surfynol 104 and
50% Isopropyl Alcohol

**Surfynol 104PG-50**
50% Surfynol 104 and
50% Propylene Glycol

**Surfynol 104S**
46% Surfynol 104 and
54% Amorphous Silica

- Solubility: (0.1%) in water at 25 °C
- HLB = 4

### Surfynol 2502

Antifoaming Wetting Agent: Surfynol 2502 represents the first in a series of ethoxylated/propoxylated acetylenic-based surfactants that are different from the traditional Surfynol and Dynol products. It offers low dynamic surface tension levels, low pseudo-equilibrium surface tension, excellent foam destabilization, and is extremely low-VOC (1.2%). It is also easy to incorporate and is stable in hard water.

- Surfynol 2502 is a 100% active liquid
- HLB = 7.8

### Surfynol 420[1]

Wetting Agent and Defoamer: A nonionic surfactant that functions both as a wetting agent and foam control agent.

- Solubility: 0.1% in water at 25 °C (1.0 g/L)
- HLB = 4
- 1.3 moles EO on Surfynol 104

[1] For specific information on the use of our products in FDA-compliant systems, please visit our website at www.airproducts.com/surfynol.

### Surfynol 440[1]

Nonfoaming Wetting Agent: A nonfoaming, nonionic surfactant that is employed for substrate wetting.

- Solubility: 0.15% in water at 25 °C (1.5 g/L)
- HLB = 8
- 3.5 moles EO on Surfynol 104

### Surfynol 465[1]

Nonfoaming Wetting Agent: A nonionic, low-foaming surfactant that is utilized for its wetting and slight emulsification properties. Surfynol 465 has a high cloud point for utilization in high-temperature systems.

- Miscible in water
- HLB = 13
- 10 moles EO on Surfynol 104

### Surfynol 485[1]

Wetting Agent: A nonionic surfactant that functions as a wetting agent. Surfynol 485 also has slight emulsification properties.

- Soluble in water
- HLB = 17
- 30 moles EO on Surfynol 104

### Surfynol 485W[1]

Wetting Agent: A nonionic surfactant that functions as a wetting agent. The product also has slight emulsification properties. Surfynol 485W is an 85% solution of Surfynol 104 in water with lower viscosity and easier handling properties.

- Soluble in water
- HLB = 17
- 30 moles EO on Surfynol 104

### Surfynol 502[1]

Nonfoaming Wetting Agent: An acetylenic diol-based, nonionic and anionic blend wetting agent designed to provide excellent, defect-free coverage over the most difficult-to-wet substrates in aqueous systems. In certain systems, Surfynol 502 acts as a moderate defoamer and flow/leveling agent. Primary applications are those over low-energy substrates such as plastics, metals, wood and previously coated materials.

- Surfynol 502 is a 78% active liquid

### Surfynol 504[1]

Nonfoaming Wetting Agent: An acetylenic diol-based, nonionic and anionic blend wetting agent designed to provide excellent, defect-free coverage over the most difficult-to-wet substrates in aqueous systems. Primary applications are those over low-energy substrates such as plastics, metal, wood and previously coated materials.

- Surfynol 504 is an 80% active liquid

### Surfynol 61

Wetting Agent and Defoamer: A volatile, nonionic surfactant that functions as a wetting agent and defoamer. The product evaporates at room temperature to reduce water sensitivity and other undesirable surfactant side effects. The product is also useful as an alcohol and glycol ether replacement.

- Product is a 100% active liquid
- Solubility: 0.9% in water at 20 °C (9.0 g/L)
- HLB = 5–6

### Surfynol FS-80

Wetting Agent: A solvent-free, low-foaming wetting agent specifically designed for incorporation into lithographic fountain solutions. Based on acetylenic chemistry, this surfactant provides important wetting and emulsification properties in fountain solutions while eliminating the need for alcohols. Additionally, the product is environmentally friendly with ultra-low VOCs and low odor.

- Soluble in water

### Surfynol FS-85

Wetting Agent: A solvent-free, low-foaming wetting agent specifically designed for incorporation into lithographic fountain solutions. Based on acetylenic chemistry, this surfactant provides important wetting and emulsification properties in fountain solutions while eliminating the need for alcohols. Additionally, the product is environmentally friendly with ultra-low VOCs and low odor.

- Soluble in water

### Surfynol OP-340

Wetting Agent: A liquid product designed to be compatible and perform well with the various acrylic resins commercially utilized in aqueous overprint varnishes (OPV). The product was developed specifically to provide low surface tension and excellent substrate wetting at competitive formula costs for aqueous overprint varnishes over wet or dry lithographic inks.

- Slightly soluble in water

### Surfynol PSA-204[1]

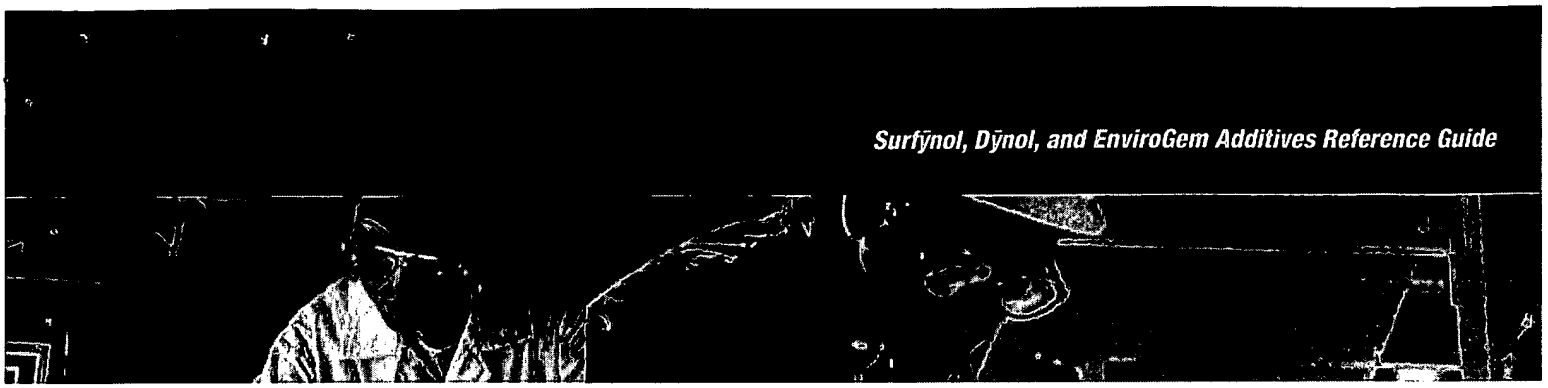
Low-Foaming Wetting Agent: A low-foam wetting agent based on proprietary acetylenic diol technology designed to solve formulating problems in water-based pressure-sensitive adhesive applications, especially in SBR latex adhesives. The product provides excellent wetting with minimal effect on final adhesive properties.

### Surfynol PSA-216[1]

Wetting Agent and Defoamer: A defoaming wetting agent based on proprietary acetylenic diol technology designed to solve formulating problems in water-based pressure-sensitive adhesive applications, especially in both acrylic and vinyl acrylic adhesives. The product provides excellent wetting with minimal effect on final adhesive properties.

- Soluble in water

[1] For specific information on the use of our products in FDA-compliant systems, please visit our website at www.airproducts.com/surfynol.



### Surfynol PSA-336[1]

Wetting Agent: A powerful solvent-free wetting agent with moderate foaming tendencies, based on proprietary acetylenic diol technology. The product offers the lowest dynamic surface tension and is designed to provide the appropriate balance between wetting agent and defoamer that is required for water-based pressure-sensitive and laminating adhesive applications, especially in gravure applications for labels.

- Moderately soluble in water

### Surfynol SE

Wetting Agent and Defoamer: Surfynol SE is a nonionic defoaming surfactant which can act as a highly effective wetting agent, defoamer and viscosity stabilizer and often performs more than one of these functions in combination.

- Surfynol SE is an 80% active liquid
- Solubility: 0.14% in water at 25 °C (1.4 g/L)
- HLB = 4–5

### Surfynol SE-F[1]

Wetting Agent and Defoamer: Surfynol SE-F is a nonionic self-emulsifiable surfactant that will reduce surface tension and control foam. This product's self-emulsifiable nature improves ease of addition into water-based systems.

- Surfynol SE-F is an 80% active liquid
- Solubility: 0.14% in water at 25 °C (1.4 g/L)
- HLB = 4–5

## *EnviroGem Surfactants*

### EnviroGem AD01

Defoaming Wetting Agent: A 100% active, liquid, low-odor, APE-free and HAPs-free nonionic surfactant. EnviroGem AD01 surfactant demonstrates fast knockdown defoaming, foam control and wetting in many applications.

- HLB = 4
- Chemical stability from pH 3–13

### EnviroGem AE01

Low-Foam Wetting Agent: A 100% active, low-foam wetting agent that has shown superior flow and leveling properties in many waterborne systems. EnviroGem AE01 surfactant can be used to minimize defects caused by entrained air or poor wetting, such as orange peel, cratering, pigment settling and low gloss. EnviroGem AE01 surfactant is classified as readily biodegradable by both OECD 306 (marine) and OECD 301A-F (fresh water), which makes it ideal for environmentally sensitive applications.

- HLB = 5
- Solubility: 0.2 wt % in water at 25 °C (2.0 g/L)

### EnviroGem AE02

Low-Foam Wetting Agent: A 100% active, low-foam wetting agent that has shown superior flow and leveling properties in many waterborne systems. EnviroGem AE02 surfactant can be used to minimize defects caused by entrained air or poor wetting, such as orange peel, cratering, pigment settling and low gloss. EnviroGem AE02 surfactant is classified as readily biodegradable by both OECD 306 (marine) and OECD 301A-F (fresh water), which makes it ideal for environmentally sensitive applications.

- HLB = 4
- Solubility: 0.05 wt % in water at 25 °C (0.5 g/L)

### EnviroGem AE03

Low-foam Wetting Agent: A 100% active, low-foam wetting agent that has shown superior flow and leveling properties in many waterborne systems. EnviroGem AE03 surfactant can be used to minimize defects caused by entrained air or poor wetting, such as orange peel, cratering, pigment settling and low gloss. EnviroGem AE03 surfactant is classified as readily biodegradable by both OECD 306 (marine) and OECD 301A-F (fresh water), which makes it ideal for environmentally sensitive applications.

- HLB = 4
- Solubility: 0.05 wt % in water at 25 °C (0.5 g/L)

## *Dynol High-Performance Surfactant*

### Dynol 604

Ultra Wetting Agent: A low-VOC, low-foam, nonionic wetting agent ideal for high-performance waterborne applications. The product offers an excellent balance of properties, generally not found in fluoro or silicone surfactants, making it an alternative for difficult-to-wet-substrates requiring good flow and leveling. This wetting agent has the ability to reduce both equilibrium and dynamic surface tension to a degree not found with other surfactants.

- Dynol 604 is a 100% active liquid
- Equilibrium surface tension: 26 dynes/cm in water at 0.05% (0.5 g/L)
- Dynamic surface tension: 28 dynes/cm in water
- Solubility: <0.1% in water at 25 °C (1.0 g/L)

## *Surfynol Antifoams/Defoamers*

### Acetylenic-Based

### Surfynol DF-37[1]

Defoamer: A nonionic, acetylenic-based defoamer which promotes foam control as well as surface wetting. This product was developed for use during latex glove and waterborne coating dipping applications to eliminate web formation while minimizing surface defects. Other applications include inks, adhesives and paints.

- Emulsifiable in water

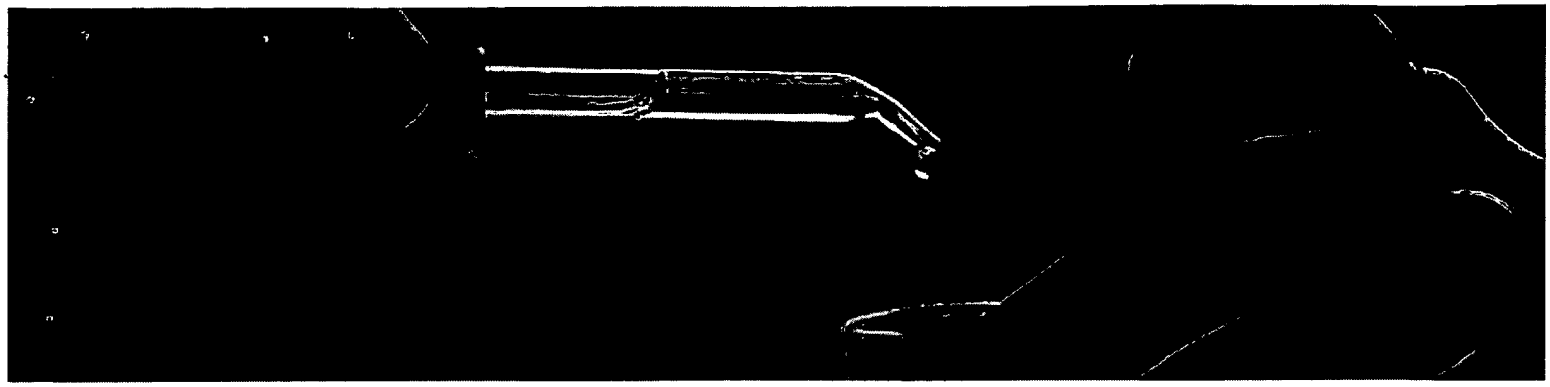
### Surfynol DF-110D and DF-110L

Defoamer: A nonionic, nonsilicone acetylenic-based product useful for defoaming in aqueous systems without the side effects typical of many foam control agents. The product is also a deairentrainment agent in aqueous high-solids systems.

Surfynol DF-110D and DF-110L are liquid products solubilized in low-molecular-weight glycols.

- Solubility: 0.03% in water at 25 °C (0.3 g/L)
- HLB = 3

[1] For specific information on the use of our products in FDA-compliant systems, please visit our website at www.airproducts.com/surfynol.



### Surfynol MD-20[2]

Molecular Defoamer: A 100% active, nonsilicone, liquid product based on Gemini surfactant technology. This is a unique multifunctional defoamer, providing a combination of foam control and dynamic wetting, offering formulators the potential to reduce overall additive levels while further reducing surface defects. Used alone or in combination with other Surfynol wetting agents, Surfynol MD-20 is exceptionally effective at eliminating microfoam and other foam-related defects.

### Surfynol PC

Defoamer: A nonsilicone defoamer and pigment shock reducer for paper coating formulations. Surfynol PC is extremely stable, retaining its defoaming activity even during recycling of the formulation. Surfynol PC defoamer may also be used in pigmented systems, such as paints, and in systems where foaming influence is a water-soluble polymer.

## Silicone-Based

### Surfynol DF-58

Defoamer: Surfynol DF-58 is a silicone-based foam control agent useful in aqueous systems, especially in industrial maintenance coatings and wood coatings. The product has strong foam control and deairation performance. In addition, the product has been modified to prevent surface defects caused by many conventional defoamers.

- Surfynol DF-58 is a 100% active liquid
- Emulsifiable in water

### Surfynol DF-62

Defoamer: An ether-modified polysiloxane-based defoamer. The product is designed to provide excellent knockdown defoaming and sustained antifoaming over time. Appropriate applications include waterborne wood coatings, industrial maintenance coatings, printing inks and pigment grind applications.

- Surfynol DF-62 is a 100% active liquid
- Emulsifiable in water

### Surfynol DF-66

Defoamer: An acetylenic-modified, polysiloxane-based emulsion defoamer. The product is designed for use in aqueous ink systems. It is recommended for use in pigment grinding and letdown applications. Surfynol DF-66 defoamer provides an excellent balance of initial knockdown and sustained defoaming with no detrimental effects on printability in a water-based ink system.

- Surfynol DF-66 is a 46% active liquid
- Emulsifiable in water

### Surfynol DF-574

Defoamer: A self-emulsifying product formulated with organic and organo-modified silicone components. The product was designed as a rapid knockdown defoamer for use in aqueous coatings and inks. Surfynol DF-574 defoamer can provide effective removal of entrained air and foam generated during the manufacture of water-based coatings and inks.

- Emulsifiable in water

### Surfynol DF-695[1]

Defoamer: A silicone emulsion defoamer designed for water-based coatings and inks. The product is effective in both the grind step and letdown. It is particularly useful in acrylic-resinated systems.

- Emulsifiable in water

## Organic-Based

### Surfynol DF-70[1]

Defoamer: An organic-based defoamer designed specifically for water-based formulations. The product is an effective knockdown and sustained antifoamer. It is particularly suited for use in acrylic and styrene-acrylic systems.

- Product is a 100% active liquid and should be mixed prior to use
- Dispersible in water

### Surfynol DF-75[1]

Defoamer: An oil-free, nonsilicone defoamer designed for aqueous systems. The product is an effective knockdown and sustained defoamer. It is particularly beneficial in acrylic-resinated systems.

- Product is a 100% active liquid
- Emulsifiable in water

### Surfynol DF-210

Defoamer: A nonsilicone defoamer developed for aqueous coatings and inks. It is especially useful in systems to be applied over absorbent substrates. The product is useful in the letdown for long-term foam control.

- Dispersible in water

## *Surfynol Pigment Dispersion Additives*

### Surfynol CT-111

Pigment Grind Aid and Wetting Agent: A low-foaming, solvent-free, nonionic additive designed as both a substrate wetting agent and as a grind aid for low-HLB pigments. As a pigment grind aid, Surfynol CT-111 should be used in conjunction with an anionic dispersant or grind resin. As a substrate wetting agent, the product improves coverage and flow properties.

- Solubility: 0.5% in water at 25 °C (5 g/L)
- HLB = 8–11

### Surfynol CT-121

Pigment Grind Aid: A low-foaming, solvent-free, nonionic grind aid specifically designed for wetting organic pigments of mid-range HLB values. Surfynol CT-121 promotes maximum color strength while reducing the required grind time. The product should be used in conjunction with an anionic dispersant or grind resin.

- Miscible in water
- HLB = 11–15

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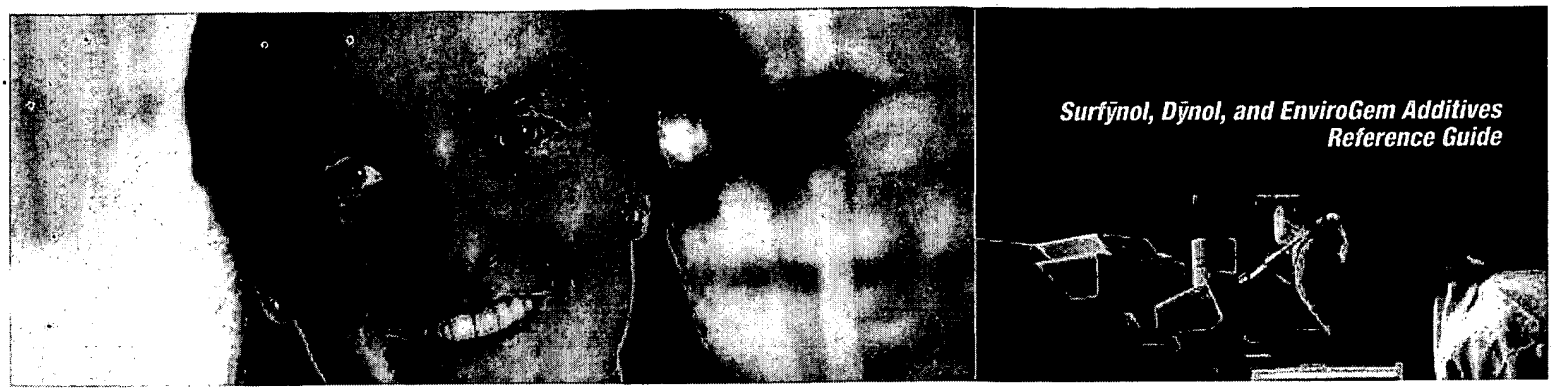
[1] For specific information on the use of our products in FDA-compliant systems, please visit our website at www.airproducts.com/surfynol.

[2] Commercial quantities of this material are expected in the summer of 2003. Please contact your local Air Products representative for more information.




### Surfynol CT-131

Pigment Grind Aid and Dispersant: A solvent-free, nonionic/anionic grind aid designed for aqueous pigment wetting and dispersion. Surfynol CT-131 is recommended for high-HLB organic pigments and all inorganic pigments. The product is also useful in dispersions of the universal type. Surfynol CT-131 can be utilized in conjunction with a grind resin or for "resin-free" grinding.

- Miscible in water
- HLB = 11–20

### Surfynol CT-211

Pigment Grind Aid and Wetting Agent: A nonionic additive designed for both pigment and hydrophobic substrate wetting. It is both solvent-free and APE-free. As a pigment grind aid, it is suitable for use with hydrophobic pigments, due to its relatively low HLB value (8–11). As a wetting agent, it finds use in water-based coatings, inks, adhesives and many other systems. Use levels will be between 0.1% and 3.0% on total formulation for wetting applications and between 3% and 15% on dry pigment weight, depending on the pigment used. It is commonly formulated in combination with anionic surfactants, such as Surfynol CT-141 or water-soluble grind resins.

- HLB = 8–11

### Surfynol CT-221

Pigment Grind Aid: A nonionic grind aid, specifically designed for pigment wetting and stabilization. It is both solvent-free and APE-free and is suitable for use with pigments that have mid-range HLB (11–15) values. Surfynol CT-221 provides low viscosity at high pigment loadings and excellent dispersion stability in resin-free and resin-containing grinds. Use levels will be between 3% and 15% on dry pigment weight, depending on pigment used.

- HLB = 11–5

### Surfynol CT-231

Pigment Grind Aid and Dispersant: A solvent-free and APE-free, nonionic/anionic grind aid. It is designed for aqueous pigment wetting and dispersion. Surfynol CT-231 is suitable for use with pigments with a wide-range of HLB values (8–20) for formulating resin-free grinds. Surfynol CT-231 provides low viscosity at high pigment loadings and excellent dispersion stability. Use levels will be between 3% and 15% on dry pigment weight, depending on the pigment used. It is commonly formulated in combination with anionic surfactants, such as Surfynol CT-141, or hydrophilic high-density pigments, such as iron oxides or titanium oxides.

- HLB = 8–12

### Surfynol CT-136

Pigment Grind Aid and Dispersant: A highly formulated product to aid in low-foam grinding, dispersion and viscosity control of pigments in aqueous media. The product is also recommended for grinding and dispersing universal tint bases, regardless of pigment type. Surfynol CT-136 can be employed with resin or in resin-free grinds. The grind aid is suitable with high-HLB organic and all inorganic pigments.

- Miscible in water
- HLB = 11+

### Surfynol CT-141

Dispersant: Low-molecular-weight dispersant designed to aid in aqueous pigment dispersion or to control viscosity in a finished system. The product is anionic for highly efficient charged stabilization. This product is commonly used as a post-add in waterborne inks.

- Soluble in water

### Surfynol CT-151

Dispersant: A highly efficient anionic pigment dispersant that, when included in waterborne industrial coatings and inks, leads to reduced grind viscosity and particle size. Surfynol CT-151 dispersant has no deleterious effect on gloss or corrosion resistance and provides excellent viscosity/dispersion stability and low process/application foam.

- Soluble in water

### Surfynol CT-171

Pigment Grind Aid and Dispersant: A solvent-free anionic/nonionic grind aid designed to provide both effective pigment wetting and dispersing characteristics for many types of organic pigments. The product provides long-term dispersion and finished ink viscosity stability, especially in troublesome pigments such as lithol rubine. Surfynol CT-171 is effective for both resin and resin-free dispersions.

- Soluble in water

### Surfynol CT-324

Pigment Grind Aid and Dispersant: A formulated additive designed to facilitate the dispersion of titanium dioxide and other inorganic pigments. The product can give high-solids dispersion at optimal viscosities, with low foam. The product can be used alone or with other dispersants.

- Miscible in water
- HLB = 13+

### Surfynol GA

Pigment Grind Aid: A blend of nonionic surfactants designed as a grinding aid for organic pigments of mid-HLB range. Surfynol GA rapidly wets out the pigment and controls mill-base foam and viscosity. The product is used in conjunction with anionic dispersants and grind resins.

- Miscible in water
- HLB = 13+

### Surfynol TG

Pigment Grind Aid and Wetting Agent: A low-foaming nonionic surfactant blend useful for substrate wetting and as a grind aid in low-HLB pigment dispersion. As a pigment grind aid, Surfynol TG is used and is compatible with anionic surfactants or grind resins. The product will also prevent water spotting in water rinses. Surfynol TG shows excellent curtain stability in curtain coating applications.

- Solubility: 0.5% in water at 25 °C (5.0 g/L)
- HLB = 9–10

AIR PRODUCTS

## For Samples or More Information

If you would like additional information or technical assistance in preparing specific formulations, write or call Air Products and Chemicals, Inc. at the following locations.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